The Technical Cooperation Program
Joint Systems and Analysis Group

JSA Master List of Issues

Preface

In the course of its business, TTCP's JSA Group regularly identifies, discusses and acts upon diverse issues affecting the context and content of collaborative activities both across the TTCP Groups and within the JSA itself. The **JSA Master List of Issues** is a management tool for assisting the Group's National Representatives, the NAMRAD Principals, the Washington Deputies and other TTCP senior representatives in remaining aware of the various issues under consideration, and of their status. The Master List is maintained through the office of the JSA Executive Chair. An on-line version of the Master List is available on the TTCP Web Site at http://www.dtic.mil/ttcp.

Master List Index[1]

Active Issues: **Summary**

Closed Issues: ***Summary***

[1] Hyperlinks are used to aid navigation through the Master List. Click on the hyperlink to access the referenced text. You can return to the Index by using the arrows in the Hyperlink Menu.

Summary of Active Issues

Issue Number	Description	Date Entered	Status
JSA-ML-0001	Analysis Methodologies and Technologies that Support Effects-Based Operations	July 2000	Champion is JSA-AG-10. The AG was formed in July 2000 with a 2 year mandate to advance the understanding of methodologies and technologies that support effects-based operations by (1) determining the state-of-the-art, (2) identifying methodologies/ technologies for exchange, and (3) recommending future avenues of development. Results will be reported at the JSA 2001 & 2002 Annual Meetings.
JSA-ML-0002	TTCP M&S Roadmap for Enabling Experimentation in System-of-Systems	July 2000	Champion is JSA-TP-2. At NAMRAD 1999, the Principals requested that JSA develop a strategy for increasing the use of Advanced Distributed Simulation in TTCP. To this end, JSA-TP-2 provided a draft TTCP M&S Roadmap for Enabling Experimentation in System-of-Systems at the JSA 2000 Annual Meeting. The TP-2, with the support of the JSA NRs, will further refine the Roadmap through interactions with selected Groups. The JSA Exec Chair will present the Roadmap at the Exec Chairs 2000 Workshop for its support prior to presenting to the Principals at NAMRAD 2000.
JSA-ML-0003	Enhancing Effectiveness of Small Dismounted Combatant Units in the Future Battlespace	July 2000	Champion is JSA-AG-7. At the 2000 Annual Meeting of JSA, JSA-AG-7 presented its analysis of Technology Requirements for Soldier System Modernization in the 2015 Timeframe. JSA has tasked AG-7 to develop the TOR and detailed 3-year workplan for a new JSA TP that would lead TTCP efforts to address the integration of these technologies into future soldier systems so as to enhance individual and unit effectiveness in the future battlespace. The JSA NRs will decide at the 2001 Annual Meeting on the merits of proceeding with the proposal..
JSA-ML-0004	Emerging Distributed Intelligent Systems and their impact on Operations/Systems in 2015	July 2000	Champion is JSA US NR. At NAMRAD 1999, the Principals requested that JSA consider leading a pan-TTCP effort to better understand emerging technologies and related operational/system issues for sharing intelligence among machines and humans, on a 10-15 year horizon. The JSA will develop a proposal for examining the issue of distributed intelligent systems, to include the human, to bring forward to the Exec Chairs Workshop and NAMRAD 2000.
JSA-ML-9901	Operational Analysis Issues for Information Warfare	July 1999	Champion is JSA-TP-3. The TP has been requested to examine and report on the OA issues in Information Warfare, as a JSA contribution to the TTCP way ahead in IW. The results of the TP's initial analysis were reported at the JSA 2000 Annual Meeting and will be further explored in the coming year. The TP will also

			propose to present its findings at the next C3I-sponsored TTCP Workshop on IW.
JSA-ML-9902	System Challenges for the Land/Air Battle of 2015	July 1999	Champion is JSA-TP-1. The TP was tasked in July 1999 to provide a TTCP perspective of the concepts and technologies important to the future land/air battle, and the key challenges that need to be addressed. The TP has prepared a report on the subject that was presented at the JSA 2000 Annual Meeting. JSA has requested that the TP explore, in consultation with other Groups, the feasibility of a series of TTCP-led Synthetic Environment Experiments for the Land/Air Battle (SEELAB) to address these challenges, with recommendations to be presented at the JSA 2001 Annual Meeting.
JSA-ML-9903	Systems Engineering for Defence Modernization	July 1999	Champion is JSA-TP-4. The Panel, created in July 1999, has begun with a 2-year transition period where it will initiate collaboration in the areas of Simulation Based Acquisition, Safety-Critical Systems and others. The JSA NRs also agreed at their 2000 Annual Meeting to develop a paper addressing the importance of TTCP leadership in the area for discussion with the Principals at NAMRAD 2000.
JSA-ML-9905	Modeling and Simulation-Enabled Visualization for Systems/Concept Development	July 1999	Lead is JSA-TP-2. The TP was been requested to examine the direction of M&S-enabled visualization technologies as applied to the development of new concepts, systems and models. Progress was reported at the JSA 2000 Annual Meeting with a final report due in the coming year.
JSA-ML-9906	Scientific Methodologies Applied to Lessons Learned from Military Operations	July 1999	Champion is JSA-TP-3. At the JSA 2000 Annual Meeting, the AS NR led a discussion comparing lessons-learned methodologies among the nations. It was agreed that there is scope for improvement in these methodologies and supporting analysis methods. JSA-TP-3 has been tasked to study further the issues and to recommend a way ahead at the JSA 2001 Annual Meeting.
JSA-ML-9802	Logistics for the Future Battlespace	June 1998	Champion is JSA-TP-3. The TP was tasked to champion pan-TTCP consideration of the concepts and technologies for future logistics. TP-3 provided initial recommendations at the 2000 JSA Annual Meeting with a further report due at the 2001 meeting. The TP will examine the potential for pan-TTCP activities to commence in the coming 1-2 years.
JSA-ML-9705	Unmanned Aerial Vehicles	October 1997	Champion is JSA-AG-8. After the pan-TTCP UAV workshop held in June 1998, the AG was formed with a 2 year mandate to consider future UAV concepts. To date, a suitable methodology has been defined, Concept of Use workshops held to develop notional UAV concepts and identify

			capability needs, and followed by a Technology Assessment Workshop to identify critical technologies. Also, planning was undertaken for Global Hawk overflights of Canada in 2000, with TTCP observation of AS overflights scheduled for 2001. Transition of the AG activities to AER-TP-6 will be progressed in the coming year.
JSA-ML-9706	Defence Technology Management Practices	October 1997	Champion is JSA-AG-9. A mini-conference was held in conjunction with the June 1998 JSA annual meeting, comparing UK and CA experiences. As a result, JSA-AG-9 was formed in June 1998 to progress collaboration in the area of defence science and technology management practices with a particular focus on knowledge management. The AG has published a compendium on S&T management best practices among the nations. It will provide technical advice to TTCP efforts to institute both an electronic library and technology watch function using knowledge management principles. The AG will provide recommendations for further TTCP collaboration at the JSA 2001 Annual Meeting.

Issue Ref No: JSA-ML-0001

Issue: Analysis Methodologies and Technologies that Support Effects-Based Operations

Date Entered: July 2000

Champion: JSA-AG-10 Technologies for Effects Based Operations (US Chair)

Status: Initiated at the JSA July 2000 Annual Meeting, the JSA-AG-10 was created with a two year mandate and will commence work in the Fall of 2000. It will deliver an intermediate report to the JSA at its 2001 Annual Meeting and a final report at its 2002 Annual Meeting. Substantive technical reports will be delivered in March 2001, November 2001 and March 2002.

Context: Modern conflict management for military operations across the spectrum of conflict that engage coalition partners demands a rigorous analytic foundation for the generation of effects-based options for operations that is shared and understood among the partners. These options must be connected cognitively to the effects desired by the national decision-making authorities, while enabling efficient and effective operations that accrue minimum collateral damage with unambiguous effectiveness indicators. To do this, substantial analytical technologies are needed, technologies that should be shared among the coalition partners. These partners need not have common options derived from the technologies but should understand the analytical basis by which each is generating their options for operations.

The JSA-AG-10 Technologies for Effects-Based Operations has been created with a 2-year mandate to:

(1) determine the state-of-the-art in methodologies (models and simulations) and databases among the TTCP nations for the generation of effects-based options for military operations,
(2) identify methodologies/technologies for exchange among the members as appropriate, and
(3) recommend avenues of future development (separate, joint or shared as appropriate).

At the JSA 2001 Annual Meeting (June 2001), the Action Group will brief the JSA on (1) and provide a preliminary assessment of (2).

At the JSA 2002 Annual Meeting (June 2002), the Action Group will brief the JSA on the final assessment of (2) and (3).

Issue Ref No: JSA-ML-0002

Issue: TTCP M&S Roadmap for Enabling Experimentation in System-of-Systems

Date Entered: July 2000

Champion: JSA-TP-2 Modeling and Simulation (US Chair)

Status: JSA-TP-2 has prepared a draft M&S Roadmap. The roadmap will be refined in consultation with other Groups for presentation and endorsement at the 2000 Exec Chairs Workshop and at NAMRAD 2000.

Context: At NAMRAD 1999, the Principals requested that JSA develop a strategy for increasing the use of Advanced Distributed Simulation in TTCP. To this end, JSA-TP-2 provided a draft TTCP M&S Roadmap for Enabling Experimentation in System-of-Systems at the JSA 2000 Annual Meeting.

Through the roadmap, JSA-TP-2 will identify the M&S requirements and shortfalls by carrying out an analysis that will involve:

- identification of a set of "use cases" that require a significant system-of-systems perspective;
- identification of the M&S capability required to support the "use cases";
- identification of the shortfall in M&S capability for each "use case";
- analysis of the shortfalls to derive the priority areas of M&S research required.

The Roadmap currently identifies four "M&S use cases" defining challenging system-of-system scenarios against which to explore the key M&S issues:

- Common situational awareness for coalition operations
- Coalition based Operations Other Than War (OOTW)
- Maritime skills training in a coalition context
- Littoral operations - deriving the needs of the joint and common battlespace

JSA-TP-2, with the support of the JSA NRs, will further refine the Roadmap through interactions with selected Groups to identify opportunities to link its investigations to specific collaborative activities and experiments being planned by these Groups in the next 1-3 years.

The JSA Exec Chair will present the Roadmap at the Exec Chairs 2000 Workshop for its support prior to presenting to the Principals at NAMRAD 2000 for endorsement.

Issue Ref No: JSA-ML-0003

Issue: Enhancing Effectiveness of Small Dismounted Combatant Units in the Future Battlespace

Date Entered: July 2000

Champion: JSA-AG-7 Small Unit Land Operations (UK Chair)

Status: The JSA-AG-7 has prepared a report on Technology Requirements for Soldier System Modernization in the 2015 Timeframe. It will provide JSA with the TOR and 3-year workplan for a new JSA Technical Panel, with a decision taken by JSA at its 2001 Annual Meeting.

Context: At the 2000 Annual Meeting of JSA, JSA-AG-7 presented its analysis of Technology Requirements for Soldier Modernization in the 2015 Timeframe. As emphasized in the AG-7 report, and supported by the JSA NRs, small units of dismounted combatants will remain essential to the effective conduct of a wide range of military operations. Such units will be required increasingly to:

- operate both independently and when integrated into large units, frequently in coalition,
- operate in complex terrain and situations, and
- respond to a variety of complex mission types characterized by challenging Rules of Engagement.

Similar issues appear to exist across the spectrum of small units including Special Forces, Commandos, Marines and Infantry Soldiers. The potential exists for performance optimization of these units to be informed by systematic Operational Analysis and system level design and integration studies, in particular that meld the human, technological, and system dimensions.

To build on these findings, JSA has requested that the AG-7 submit the TOR and 3-year workplan suitable for a TTCP Technical Panel. The expected focus of the Panel would be to lead TTCP efforts to address the integration of enabling technologies into future systems so as to enhance the effectiveness of individual and small units of dismounted combatants in the future battlespace.

The proposal is to include the following elements:

- Terms of Reference consistent with the scope of a TTCP Technical Panel,
- identification of core work themes and the work program for the next three years, articulating the linkages to the AG-7's technology requirements document, and
- potential resource contributions from the five nations.

The proposal is to take into account the JSA Strategic Plan, to highlight the systems aspects of Dismounted Combatant Science and Technology, and to note the likely interactions with other JSA and TTCP Technical Panels, and external organizations.

The proposal is to be drafted by the end of September 2000 so as to allow a credible case to be put to the NAMRAD Principals in October 2000 by the JSA Exec Chair. The use of teleconferencing is recommended to achieve this deadline.

The JSA NRs will examine the merits of proceeding with the proposal in consultation with the NAMRAD Principals during NAMRAD 2000, with a final decision to be taken at the JSA 2001 Annual Meeting.

Issue Ref No: JSA-ML-0004

Issue: Emerging Distributed Intelligent Systems and their Impact on Operations/Systems in 2015

Date Entered: July 2000

Champion: JSA US NR

Status: Under the leadership of the US NR, JSA will prepare a proposal for the conduct of pan-TTCP activities to examine emerging distributed intelligent systems, to be presented by the JSA Executive Chair at the 2000 Exec Chairs Workshop and NAMRAD 2000.

Context: At NAMRAD 1999, the Principals requested that JSA consider leading a pan-TTCP effort to better understand emerging technologies on a 10-15 year horizon for sharing intelligence among machines and humans and related operational/system opportunities and challenges.

Given that the issue is yet to be precisely defined, the JSA NRs will provide the following to the US NR by 15 August 2000.

1. The perceived or declared national interest in the concept of distributed intelligence among intelligent systems and humans;
2. The national interest or concern in tradeoffs between the burden on the human and the burden on automation in realizing intelligence derived from diverse sources;
3. Brief descriptions of national initiatives that would be relevant to the topics of intelligent systems, distributed intelligent systems, or distributed intelligent systems integrated with human intelligence; and
4. National technology explorations that could be enablers for the concept of distributed intelligence.

The US NR will identify common themes and propose an approach for addressing the issue. The proposal will address the potential for other TTCP Groups to collaborate in the context of pan-TTCP activities. The JSA Exec Chair will bring the proposal forward to the 2000 Executive Chairs Workshop and NAMRAD.

Issue Ref No: JSA-ML-9901

Issue: Operational Analysis Issues for Information Warfare

Date Entered: July 1999

Champion: JSA-TP-3 Systems Concepts and Analysis (UK Chair)

Status: JSA-TP-3 has been requested to examine and report on the Operational Analysis issues in Information Warfare, as a JSA contribution to the TTCP way ahead in IW. The initial TP-3 perspective was reported at the JSA 2000 annual meeting, and further work agreed.

Context: The emerging warfare area referred to as Information Warfare (increasingly referred to as Information Operations) - to suitably protect own-force information and related processes, or to disrupt the enemy's information and processes - is viewed to be critical to success in the modern battlespace. In a recent effort led by the C3I Group and involving EWS and JSA Groups, TTCP has examined its way ahead for collaboration in Information Warfare.

In establishing the TTCP focus for work in IW, it has been recognized that the issues of *context, domain* and *function* as outlined below provide an appropriate taxonomy through which the collaboration focus can be established. Specifically:

- the *context* in which IW is executed is established by the following factors: Mission; Partners (Single Service, Joint Coalition, OGD, NGO); Conflict Spectrum (OOTW to High Intensity Conflict); Threat (Symmetric/Asymmetric, Motivation, Technology, Capability); Policies (Government, DoD, OGD, Legislation, Industry, Motivation); Culture; Doctrine, Tactics, Techniques, Procedures (TTP); and Rules of Engagement
- the *domain* to which IW is applied can be divided into: Communications/Networks; Information Systems; Weapon Systems; Sensors; Platforms; and People.
- finally, the specific IW *function* can be one of: Protect; Deter; Detect; Recover (Forensics); React (Pursue, Forensics); or Engage (Destroy, Deceive, Deny, Jam, Corrupt)

An initial focus for TTCP collaboration has been bounded as follows:

- *Context*: Non-high intensity conflict; asymmetric threat; effect of partners, policies, culture, doctrine and ROE;
- *Domain*: Communications/Networks; Information Systems; and People; and
- *Function*: Protect; Deter; Detect; Recover; and React.

A pan-TTCP Workshop on "Information Operations to Counter Asymmetric Threats" was held in Ottawa in March 1999, involving the technical, operational, and intelligence

communities (including the computer emergency response community). The Workshop identified the following issues for further consideration:

- TTCP involvement in the "Human Issues" (PSYOP) in IW;
- TTCP involvement in offensive Information Operations;
- linkages with the Operational Research community; military operational staffs and with CERT activities; and
- implications for the Critical National Infrastructure

It was recognized that existing TTCP Groups and Panels are well positioned to pursue these issues, including C3I (notably C3I-TP-11), JSA, EWS and possibly HUM.

In order to further explore these issues, JSA requested at its July 1999 Annual Meeting that JSA-TP-3 examine the various Operational Analysis issues in IW as identified in the findings of the above Workshop and through other pertinent national activities. The initial focus was to be on the deficiencies in OA tools and methodologies currently available to examine IW within the above taxonomy and on topics ripe for collaborative OA.

JSA-TP-3 addressed these issues in a broad context of Information Operations at a classified workshop in May 2000. The preliminary findings were reported to JSA at its 2000 Annual Meeting and the Workshop report will be published in mid-2000.

In taking this issue forward, TP-3 has identified that there is interest among the nations in comparing methodologies for cultural mapping, which its workshop identified as an important element in understanding IO issues; the TP plans to conduct a second workshop specifically on this issue in the coming year. Further, the JSA Group identified the benefits of having the results of the JSA-TP-3 Workshop presented at the forthcoming TTCP IW Workshop being sponsored by the C3I Group. It requested that TP-3 take appropriate action to link these activities.

Issue Ref No: JSA-ML-9902

Issue: System Challenges for the Land/Air Battle of 2015

Date Entered: July 1999

Champion: JSA-TP-1 Land Systems (AS Chair)

Status: JSA-TP-1 has been requested to champion pan-TTCP consideration of the concepts and technologies important to the future land/air battle. A report of the TP's findings was presented at the JSA 2000 Annual Meeting. Building on these findings, the TP has been requested to examine, in consultation with other Groups, the feasibility of TTCP-led Synthetic Environment Experiments for the Land/Air Battle to be led by JSA-TP-1. Recommendations are to be presented at the JSA 2001 Annual Meeting.

Context: The Land/Air battle of 2015 will be technologically sophisticated, complex, and will involve a large number of entities, both manned and unmanned. Sensor-to-shooter technology will allow weapons to be activated remotely. Consequently, land/air battle management will have problems similar to those in air traffic control, but much more varied and extensive. Air Defence must be organic - all elements must work as a coordinated group. Several important aspects of Land/Air, include: Joint command and mission planning; Air Defence - both the fighter and SHORAD aspects; Joint picture compilation - both air and ground, given that both affect the outcomes of the Land battle; Manoeuvre Air Battle - helicopters, fixed wing aircraft and UAVs sharing the same airspace; Combat Identification (air-to-ground is the biggest issue, as in the Gulf War); common planning; layers of surveillance. Thus, there is a need to study the future battlefield as an entity, with a protective, layered cocoon around it (the Land equivalent of a US Carrier Task Force). This leads to considerations of the Land/Air battle as a system.

JSA-TP-1 was tasked at the JSA 1999 Annual Meeting to provide a TTCP perspective of the concepts and technologies important to the future land/air battle, and the key challenges that need to be addressed. In response to this task, the TP has prepared a report "System Challenges for the Land/Air Battle 2015" that was presented at the JSA 2000 Annual Meeting. To build on the findings of the report and to pursue the key challenges so identified, JSA has requested that the TP explore, in consultation with other Groups, the feasibility of a series of TTCP-led Synthetic Environment Experiments for the Land/Air Battle (SEELAB) to address these challenges. Recommendations are to be presented at the JSA 2001 Annual Meeting.

Specifically, the JSA-TP-1 has been requested to organize and conduct a workshop to be led by AS in conjunction with the TP's Annual Meeting being held in Canada in October 2000. The workshop will explore:

- the identification of the candidate scenario(s) and coalition/warfighter issues to be the focus for SEELAB-1;

- the architecture, components and connectivity of the synthetic environment necessary to conduct the experiments, examining in particular the feasibility of internationally-distributed SE;
- the participation and resources necessary to establish the synthetic environment and to conduct the experiment; and
- the linkages to other TTCP Groups and external organizations (e.g. QWG AOR, JBLNet) and their contributions necessary for effecting the experiment.

It is essential that all four objectives of the workshop be iterated so as to develop an achievable yet high value-added experiment. It is also recognised that one workshop will likely be insufficient to resolve all the issues and achieve a final consensus on the experimentation strategy.

Participation at the October workshop should include the JSA NRs for the US and CA, as well as representation from JSA-TP-2, JSA-TP-3, the C3I Group and QWG AOR.

The JSA Exec Chair will provide a brief on the concept of the SEELAB at the Exec Chairs Workshop and NAMRAD 2000.

Issue Ref No: JSA-ML-9903

Issue: Systems Engineering for Defence Modernization

Date Entered: July 1999

Champion: JSA-TP-4 Systems Engineering for Defence Modernization (UK Chair)

Status: JSA created the new JSA-TP-4 in July 1999 to address the issue. The Panel has begun with a 2-year transition period where it will initiate collaboration in the areas of Simulation Based Acquisition, Safety-Critical Systems and others. TP progress was reported at the 2000 JSA Annual Meeting. The JSA NRs have agreed to submit a paper for the Principals' consideration at NAMRAD 2000, that highlights the NRs' views on the importance of TTCP leadership in this area.

Context: The field of systems engineering[2] has evolved a range of processes, methodologies and tools to meet the demands of large complex development projects, largely in the defence and aerospace domains. These are enshrined in recognized standards, such as the EIA (Electrical Industries of America) 632, and the emerging ISO 15288 on *Life Cycle Management – Systems Life Cycle Processes.*

These disciplines are now being seen as offering a new and systematic way of approaching a new range of challenges facing the defence communities as a whole. These include:

- Speeding up the acquisition process
- Acquiring whole military capabilities, including 'systems of systems',
- Minimizing whole life costs
- Controlling the evolution of systems throughout their operational life, to respond to user feedback, changes in the threat and the march of technology
- Linking the acquisition projects to decision processes in the customer environment, such as approval, acceptance and technology investment.

JSA-TP-4 will review and exchange best practice and latest research in the application of systems engineering techniques to the enterprise of defence in the TTCP nations. Its considerations will cover - but not be confined to - the following technical areas:

- Integrating advanced simulation and modeling techniques into the acquisition process (Simulation Based Acquisition)
- Information management, both within and across projects
- Through-life requirements management
- Integrated design techniques
- Cost modeling techniques, and their integration into the early design and trade-off processes (Cost as an Independent Variable)

[2] For the purpose of this work, we define systems engineering as 'The set of activities which control the overall design, implementation and integration of a complex set of interacting set of components, systems or applications in order to meet the needs of all stakeholders, within the constraints arising from the system's operational and development environment'

- Reliability modeling and prediction
- Acquiring systems of systems
- Linking the organizational decision and monitoring processes to those of individual projects
- Integrating the management of technology and technology demonstration for 'just in time' insertion
- Obsolescence management
- Techniques for test and evaluation, including safety and assurance
- Education and training programs aimed at improving systems engineering skills

In conducting its work, the Panel will liaise closely with acquisition reform activities in the nations, commercial industry and relevant research in defence agencies and academic institutes.

It is recognized that the potential scope defined for TP-4 is very broad, and that there are considerable differences between the nations in their practice of systems engineering, and their commitment to the acquisition reforms that will enable the adoption of some of the techniques involved. Also, the focus on process issues, rather than conventional technological research, is outside the normal range of TTCP activities. The program of work is therefore to commence with a two-year start-up phase, to be followed by a longer-term program.

Stage 1 – Start-up (July 99 – May 01), during which the Panel will:

- conduct a review of relevant activities in the nations;
- establish relations with those responsible for advanced process initiatives, where they exist;
- carry forward the recommendations of JSA-AG5 on Simulation Based Acquisition, working as required with JSA-TP2 on Modeling and Simulation;
- pursue other opportunities for initial joint activities and information exchange
- subsume the activities of JSA-AG4 on Safety Critical Systems (from July 00)
- put forward a longer-term, sustainable program of collaboration within the scope of Section 3.

The Panel will submit reports to JSA Group as follows:

- May 00: Interim Stage 1 Report, initial findings (including barriers to progress) and plans for the integration of AG4
- May 01: Final Stage 1 Report on the way forward.

Stage 2 Longer-term (July 01 onwards).

- Substantive joint program of information exchange, collaborative research and studies, leading to working papers and reports of benefit to S&T and Acquisition Managers in the nations. Special consideration should be given to experimental demonstrations of the application of advanced techniques of distributed collaborative working, for example in the form of technical demonstration program.

In parallel with the work of the TP, the JSA NRs will develop a perspective of the importance of TTCP leadership in this area and on the national support for the collaboration required that would help ensure the potential benefits of TTCP collaboration can be realized. This perspective will be presented to the Principals at NAMRAD 2000 by the JSA Exec Chair.

Issue Ref No: JSA-ML-9905

Issue: Modeling and Simulation-Enabled Visualization for Systems/Concept Development

Date Entered: July 1999

Champion: JSA-TP-2 Modeling and Simulation (US Chair)

Status: JSA-TP-2 has been requested to examine the direction of M&S-enabled visualization technologies as applied to the development of new concepts, systems and models. Progress was reported at the JSA 2000 Annual Meeting with a final report due at the 2001 Annual Meeting.

Context: Recent years have witnessed the convergence of rapidly-advancing Modeling and Simulation technologies with modified business management practices in both the civilian and defence environments. Dramatic improvements are being witnessed across a variety of domains such as concept exploration, acquisition, technology development and insertion, training and decision support. These improvements are being manifested, for example, by reduced costs during the development cycle and by shorter times from concept to product. Continuing advances in M&S enabling technologies and further maturing of the new business process models that exploit these technologies offer the potential for even more dramatic changes in both the civilian and defence sectors.

Within the TTCP community, the principle focus to date of M&S collaboration has been in the technologies enabling distributed simulation for applications such as training, constructive simulations for concept exploration, and virtual simulations for system development. Key issues for study have included network effects such as latency; architectures, software infrastructure and standards to facilitate ADS application development and re-use; and model issues such as data management, aggregation and fidelity.

An emerging M&S domain being driven by the rapid improvements in f high-performance computing, 3-D graphics and related software is that of visualization. Increasingly, M&S-enabled visualization is permitting the coupling of the human to complex synthetic environments in which the human user is able to "visualize" the environment and adaptively adjust the situation through the natural human senses (i.e. sight, speech, touch, etc.).

M&S-enabled visualization offers the potential for dramatically affecting the paradigm in which defence systems and related technologies are conceived, researched and developed. Through M&S-enabled visualization, it becomes possible for researchers to examine the interactions of complex devices and systems with their environment through high-fidelity engineering-level computer models, wherein the researcher can adaptively adjust the device or system design to achieve a desired response to the environmental stimuli by visualizing the cause-and-effect relationships at play. In another area, Test and

Evaluation (T&E) via M&S-enabled visualization during product acceptance or in failure forensics offers the potential to improve system reliability and safety by more rapidly identifying unexpected failure modes and relating these to the optimum changes in design parameters.

To further its understanding of the potential afforded by M&S-enabled visualization, particularly in the area of system, concept and model development, JSA has requested that its JSA-TP-2 examine the trends in the related enabling technologies and their application in the areas indicated. It is expected that the Panel will identify where the greatest opportunities for process improvement appear to lie, and suggest whether there are areas for potential TTCP collaboration, either to advance the enablers or to demonstrate to process owners the benefits to be derived. The preliminary findings of the TP were presented to the JSA at its 2000 Annual Meeting, with a final report due at its 2001 Annual Meeting.

Issue Ref No: JSA-ML-9906

Issue: Scientific Methodologies Applied to Lessons Learned from Military Operations

Date Entered: July 1999

Champion: JSA-TP-3 Joint Concepts and Analysis (UK Chair)

Status: At its 2000 annual meeting, JSA compared lessons-learned methodologies among the nations, and identified the potential to improve the national lessons-learned processes through the application of the scientific process and the exchange of national practices. JSA-TP-3 has been requested to progress the debate, to identify opportunities for TTCP collaboration, and to present recommendations at the JSA 2001 Annual Meeting.

Context: With the increasing diversity and complexity of missions which allied forces are undertaking, it becomes critical that sound practices are in place by which one identifies and adjusts to the key lessons coming out of these operations. The implications from these lessons can be far-reaching and can affect all aspects of defence, including how defence forces are organized, trained, commanded, equipped, and supported. Given the potential impact of implementing these lessons, it is equally critical that the lessons themselves be subjected to suitable rigor, challenge and analysis.

At its 2000 annual meeting, the JSA compared the lessons-learned methodologies currently employed in the TTCP nations. From these discussions, it examined the potential benefit to be derived from collaborative efforts in improving these methodologies. Approaches could include the joint development of improved methodologies for more systematically collecting operational information, for subjecting such information to more rigorous analysis and to quantify how different military solutions or approaches would have had improved results.

As a result of these deliberations, the JSA members agreed on the need for further study of the opportunities and to examine the feasibility of a specific collaborative work program, exploiting links with QWG AOR where possible. JSA-TP-3 was asked to further this task, and requested to provide findings and recommendations to the JSA at its 2001 Annual Meeting.

Issue Ref No: JSA-ML-9802

Issue: Logistics for the Future Battlespace

Date Entered: June 1998

Champion: JSA-TP-3 Joint Concepts and Analysis (UK Chair)

Status: JSA-TP-3 was tasked in June 1998 to champion pan-TTCP consideration of the concepts and technologies for future logistics. TP-3 reported on progress at the JSA 2000 Annual Meeting. The TP will pursue the engagement of the TTCP Groups in the activity in the coming year, with recommendations for further activity to be provided to JSA at its 2001 Annual Meeting.

Context: Recent experiences have reinforced the importance of effective logistics to the success of military operations in the post-Cold War era. In fact, there is a growing consensus that the rapidly evolving nature of military operations, driven by the myriad of global political, economic, social, environmental and technological pressures, requires significant innovation in the manner in which military operations will be supported logistically. For example, in its Joint Vision 2020, the US military has identified Focused Logistics as a critical capability for success of future US military operations. While the current interest among western armed forces is in adapting best practices and technologies from civil industry, it is also recognized that the complex and unpredictable nature of modern military operations will require prudent adaptation of civil concepts.

In the past, TTCP has not conducted extensive collaborative research focused in particular on the military capability of logistics. However, given the potentially radical changes that logistics may undergo in the coming decade, it is timely for TTCP to review the current thought on logistics for the future battlespace, and to consider whether there are opportunities for collaborative research under TTCP to contribute to the concepts, technologies and/or processes that will shape this future.

To this end, JSA-TP-3 has been requested to consider the challenges for future logistics and to stimulate pan-TTCP consideration of its potential role in addressing these challenges. To progress the task, it convened a workshop in May 2000, reported the initial results to the JSA Group in July 2000 and will produce a report on the workshop. The JSA Exec Chair will provide a summary of these findings at the 2000 Executive Chairs Workshop.

A major conclusion from the workshop was to re-affirm the value of participation by the TTCP nations in the US activity “Future Logistics Wargame 2001” (FLOW 01). This follows observation of the previous game in 1999. The invitations for the nations to participate has been issued outside of TTCP, but TP-3 identified high value in providing a means for data to support collaborative analytic efforts for FLOW 01 to be exchanged, and for the participating analysts to coordinate their efforts. TP-3 also identified the

possibility of a follow-up workshop on the issue, which could in part provide a forum for planning the analysis support of FLOW 01.

Based on the outcomes of the above, TP-3 will develop recommendations to be presented to JSA at its 2001 Annual Meeting on the way forward in its related program of work and/or of the need to engage the broader TTCP community in examining its potential role in advancing future logistics concepts and supporting technologies.

Issue Ref No: JSA-ML-9705

Issue: Unmanned Aerial Vehicles

Date Entered: October 1997

Champion: JSA-AG-8 Unmanned Aerial Vehicle Concepts (CA Chair)

Status: Pan-TTCP workshop was held 2-5 June 1998. JSA-AG-8 was formed in June 1998 to consider future UAV concepts, including possible TTCP-led technology demonstration. The AG is proceeding with a plan of work through July 2001 that includes concept exploration, OA and system demonstration.

Context: Unmanned Aerial Vehicles (UAVs) offer the potential to provide cost-effective solutions to a wide variety of missions on the modern battlefield, in particular where unmanned solutions are desirable or essential. On-going advances in platform and payload technologies that increase UAV endurance, survivability, reliability and cost are making UAVs increasingly attractive in operations heretofore considered inappropriate. That said, it is recognized that one of the greatest challenges to the introduction of UAVs into service lies with the cultural change and change to Concepts of Operations required to appropriately exploit their potential.

At NAMRAD'97, the Principals noted the growing interest among the nations for UAV solutions and for collaborative research in UAV technologies. In fact, JSA, AER, C3I, EWS, SEN and MAR Groups all expressed interest in such research. In light of this interest, the Principals directed the JSA Group to sponsor a pan-TTCP workshop on national experts in UAVs. The Workshop was conducted 2-5 June 1998 at the Applied Physics Laboratory of John Hopkins University, MD, US. Some 66 national experts representing all five TTCP nations participated. The Workshop considered the potential missions and CONOPs for UAVs in the 2015 timeframe, and the advances in platform and payload technologies that will be required. It identified opportunities and interest among the nations for collaborative research to advance these technologies. The Workshop Proceedings and final report have been published on CD-ROM.

Based on the findings and recommendations of the Workshop, the JSA Group created JSA-AG-8 on Unmanned Aerial Vehicle Concepts. The Action Group has a mandate through July 2001 to champion pan-TTCP consideration of future UAV CONOPS and the concomitant technology implications. Its specific deliverables include:

- A methodology to identify critical capability needs/gaps and assess critical technology areas (*completed*)
- The definition of a representative future coalition UAV mission (*completed*)
- For this selected mission, identification of issues and capability gaps (*completed*)
- For selected issues and capability gaps, identification and assessment of critical technologies (*completed*)

- After-action report for a US-CA HAE UAV (Global Hawk) cross-border overflight exercise planned for in 2000 (*the flight was cancelled on the eve of the event due to unresolved technical problems; however, many important lessons were learned in the course of the flight preparations and planning - these will be reported by AG-8*).
- After-action report for a US-AS HAE exercise schduled for 2001.
- Identification of other future collaborative exercise opportunities.
- An examination of the scope and feasibility of a TTCP-led modeling & simulation-based joint warfare exercise.
- Draft Terms of Reference for an associated TTCP Project Arrangement covering a follow-on activity.

At the NAMRAD 2000 meeting, it was agreed that with the completion of the JSA-AG-8 mandate in 2001, the responsibility for championing pan-TTCP activities in UAV technologies and concepts would transition to the AER Group under the auspices of its AER-TP-6. In the course of its activities for 2001, the AG will therefore engage the AER-TP-6 in order to ensure an effective transition of its work and outputs into AER.

Issue Ref No: JSA-ML-9706

Issue: Defence Technology Management Practices

Date Entered: October 1997

Champion: JSA-AG-9 Defence Science and Technology Management (CA Chair)

Status: A mini-conference was held in conjunction with the June 1998 JSA annual meeting, comparing UK and CA experiences. JSA-AG-9 was formed in June 1998 with 2-year mandate to progress collaboration in the area of defence science and technology management practices with a particular focus on knowledge management.

Context: TTCP has historically conducted collaborative activities in the context of specific defence research and technology objectives. However, the nations also recognize the benefit of sharing ideas and experiences on the practices that each employs to manage its defence technology and defence technology base. Further, given the common interest in emerging concepts such as knowledge management and measures of effectiveness as applied to defence technology management, there may also be opportunity for collaboration through TTCP in order to help develop and apply these concepts within the nations.

Within this context, the JSA Group conducted a mini-conference on Defence Technology Management Practices in conjunction with its June 1998 Annual Meeting. The conference, lead by the UK and CA, compared experiences and practices of the UK DERA and CA DRDB in managing their respective defence technology bases. The findings of the Workshop demonstrated there are many common issues each nation is facing, and definite benefit in sharing the views and lessons learned from the respective strategies and approaches.

Based on the interest generated by the mini-conference, the JSA created JSA-AG-9 on Defence Science and Technology Management. The AG has a mandate through June 2001 to accomplish the following tasks that build on the work previously completed in support of the June 1998 mini-conference:

- produce a compendium comparing approaches to key issues in defence S&T management across the TTCP nations (*completed*);
- identify opportunities for collaborative development of new methodologies and tools to address issues of common interest; and
- progress collaborative development in at least one area of common interest, with particular consideration given to the area of knowledge management.

The AG has held two Knowledge Management Workshops; given the Principals' interest in examining knowledge management practices, the TTCP Deputies were invited to participate so as to leverage on the Workshop findings. As a result, it has been agreed

that the AG will serve as the TTCP Technical Advisor to the US Deputy, who contract the effort to develop an Electronic Library and Technology Watch function for TTCP, exploiting state-of-the-art Knowledge Management techniques. The US TTCP Deputy and JSA-AG-9 will present this KM way-ahead for TTCP at NAMRAD 2000.

The AG will present recommendations for further TTCP collaboration in the area of knowledge management for S&T management at the JSA 2000 Annual Meeting.

Summary of Closed Issues

Issue Number	Description	Date Entered	Status
JSA-ML-9904	*Whole Life Cost Reduction*	*July 1999*	*Issue Closed. Champion is UK NR. JSA considered the way ahead at its 2000 annual meeting in a debate led by the UK NR. Further progress on the issue will be addressed via JSA-ML-9903.*
JSA-ML-9801	*US Army Technology and Materiel Seminar Game*	*June 1998*	*Issue Closed. As a follow-on to TTCP participation in the July 1998 wash-up of the first US Army-After-Next Technology Seminar Game, the US NR pursued direct TTCP participation in the 2000 US Army Technology and Materiel Seminar Game. The 2000 game was ultimately cancelled, but will be conducted in the next 1-2 years. The JSA NRs will remain alert to future opportunities for TTCP participation..*
JSA-ML-9803	*Exploitation of Space*	*June 1998*	*Issue Closed. At its July 1999 annual meeting, JSA examined current TTCP activities in space systems and technologies in a discussion led by the AS NR. JSA Exec Chair tabled the subject at the 1999 Exec Chairs Workshop, where it was agreed to maintain the current level of TTCP activity in space cooperation.*
JSA-ML-9701	*Simulation-Based Acquisition Processes*	*June 1997*	*Issue closed. JSA-AG-5 was formed in June 1997 to develop recommendations. Its final report was reviewed by JSA at its July 1999 annual meeting. JSA has agreed to pursue further SBA work under its new JSA-TP-4 (see JSA-ML-9903).*
JSA-ML-9702	*Wide Area Surveillance/ Recognized Picture for Coalition Operations*	*June 1997*	*Issue Closed. JSA-AG-6 was formed in June 1997 to develop recommendations. Its final report was reviewed by JSA at its July 1999 annual meeting. The strategy to implement the AG recommendations was addressed by JSA, C3I and SEN in Sep-Oct 1999. The TTCP Exec Chairs agreed at NAMRAD 99 that C3I would lead a pan-TTCP activity to progress the AG recommendations.*
JSA-ML-9703	*Planning/Analysis for Coalition Operations*	*June 1997*	*Issue Closed. JSA-TP-3 was requested in June 1998 to consider cooperative development of the appropriate OA tools to improve decision making in coalition planning A workshop was held at the May 2000 JSA-TP-3. Further development of these tools will be progressed within the TP-3's program of work.*
JSA-ML-9704	*Vulnerability of Information Operations across Joint/ Common Operations*	*June 1997*	*Issue closed. To be subsumed by the TTCP Information Warfare way ahead to be discussed at NAMRAD 98.*

***Issue Ref No**: JSA-ML-9904 (Issue Closed)*

***Issue:** Whole Life Cost Reduction*

***Date Entered:** July 1999*

***Champion:** UK National Representative*

***Status**: JSA will consider the way ahead at its June 2000 meeting in a debate to be led by the UK NR.*

***Context**: Statistics show that the costs of supporting military equipment in service exceed those of initial development by a factor of between 3 and 4 times. The pressure on defence budgets in all the nations means that there is great potential pay-off in finding ways of understanding and reducing these costs.*

Within TTCP - as in the individual national S&T programs - the great majority of the research investment is devoted to the initial development of systems, with relatively little attention paid to their operational costs. The challenges of addressing this position are considerable: real statistics are difficult to find and analyze, and it is even harder to trace these back to decisions made in the early conceptual and development stages. In the civilian world, however, whole life costs have been addressed in a systematic and determined manner, with major investments in manufacturing technology, reliability, component-count reduction and logistics.

JSA is currently making small but significant inroads into the problem in a number of areas: support for simulation technology for the reduction the costs of training and exercises in JSA-TP-2, the intended involvement in the forthcoming US Focused Logistics Wargame (FLOW) in JSA-TP-3, and the request to the new JSA-TP-4 to address Cost as an Independent Variable.

The potential for broader TTCP involvement in research and studies into whole life cost reduction was addressed at the JSA 2000 annual meeting, where the UK NR led the debate. The NRs agreed on the opportunity for TTCP to demonstrate leadership for the nations in improving their capabilities to address whole-life cost issues and related defence modernization issues by the application of emerging system engineering concepts.

Further progress on the issue will be progressed under JSA-ML-9903 System Engineering for Defence Modernization.

***Issue Ref No**: JSA-ML-9801 (Issue Closed)*

***Issue**: US Army Technology and Materiel Seminar Game*

***Date Entered**: June 1998*

***Champion**: JSA US National Representative, JSA-TP-1 Land Systems (AS Chair)*

***Status**: Issue Closed. As a follow-on to TTCP participation in the July 1998 wash-up of first US Army-After-Next Technology Seminar Game, the US NR pursued direct TTCP participation in the 2000 US Army Technology and Materiel Seminar Game. Unfortunately, the Seminar Game was cancelled. JSA NRs will remain alert to future opportunities.*

***Context**: The US Army leadership has initiated the Army After Next (AAN) program, as its coordinated intellectual investment in conceptualizing the capabilities and attributes that will define the US Army in the 2020-2025 timeframe.*

The AAN program is pioneering a number of innovative methodologies for stimulating debate on the challenges facing future armies, to capturing new ideas on how changes to force structure, doctrine and technology could address these challenges, and to analyzing and validating their potential effectiveness.

One of the new methodologies of the AAN program is the annual US Army AAN Technology Seminar Game. The principle of the Game is to engage leading military, academic and industrial experts in identifying the key technologies that will shape military operations in the 2020-2025 timeframe.

The first annual AAN Technology Seminar Game was recently conducted at the US Army War College in June/July 1998. On the initiative of the JSA National Representative, the TTCP Nations were invited to have a representative present at the one-day wash-up for the Game, held 30 July.

Since this first Seminar Game the US Army's futures program has evolved to include a new Technology and Materiel Seminar Game, by which the linkage of new technologies is made to new system concepts and existing systems. The US NR has agreed to seek approval for the participation of the TTCP technical community in the 2000 version of this Seminar Game. This involvement would serve to enrich the intellectual discussions on technology and the future of military science across the TTCP nations, providing in particular a deeper understanding of the implications of technology choices on coalition operations.

Should this participation prove feasible, then JSA-TP-1 Land Systems has been requested to coordinate and lead the participation.

At the JSA 2000 Annual Meeting, it was reported that the 2000 Seminar Game was cancelled in favor of conducting these games less frequently than annually. The JSA NRs agreed to remain alert to future such opportunities and to champion the participation of the TTCP nations wherever possible.

***Issue Ref No**: JSA-ML-9803 (Issue Closed)*

***Issue**: Exploitation of Space*

***Date Entered**: June 1998*

***Champion**: AS National Representative*

***Status**: Issue Closed. At its July 1999 annual meeting, JSA examined current TTCP activities in space systems and technologies in a discussion led by the AS NR. The JSA Exec Chair tabled the subject at the 1999 Exec Chairs Workshop to discuss future TTCP investment, where it was agreed that a significant increase in TTCP activities targeting space was not warranted at this time.*

***Context**: Full-dimensional exploitation of space is seen to be essential to the success of future military operations, either as an extension of the future land-air battlefield itself, or as an environment offering unique opportunities to enhance the effectiveness of weapons systems and C4ISR.*

While TTCP is currently engaged in collaborative research in selected technologies that support space exploitation, it is timely to consider whether these collaborative activities are sufficiently focused on the key issues of interest to the TTCP nations. Further, given that there are other vehicles available for collaboration, it is unclear whether an expanded or refocued mandate for TTCP would be appropriate.

In order to further the consideration of the possible future role for TTCP in space exploitation, the topic was debated at the JSA 1999 annual meeting in a discussion led by the AS NR and supported by two discussion papers provided by AS. The discussion noted the current space-technology work of C3I and SEN Groups, and the recent efforts of AER to examine future investment by the Group in space platform technologies. It was highlighted, however, that this work is not coordinated and is relatively modest. It was recognized that cooperative research in the area is much more active through various bilateral channels.

The JSA Exec Chair tabled the issue at the 2000 Executive Chairs' Workshop. Consensus was achieved that while space is an increasingly important environment for defence, a significant expansion in TTCP cooperation specifically targeted to space, or a restructuring of TTCP space cooperation, was not appropriate at this time. However, space technology and space as it affects systems-of-systems would continue to be addressed within on-going TTCP activities.

***Issue Ref No**: JSA-ML-9701 (Issue Closed)*

***Issue**: Simulation-Based Acquisition Processes*

***Date Entered**: June 1997*

***Champion**: JSA-AG-5 Simulation-Based Acquisition Processes (UK Chair)*

***Status**: Issue closed. JSA-AG-5 was formed in June 1997 to develop recommendations. Its final report was reviewed by JSA at its July 1999 annual meeting. JSA has agreed to pursue further SBA work under its new JSA-TP-4 (see JSA-ML-9903).*

***Context**: JSA-AG-5 Simulation-Based Acquisition (SBA) Processes was established in order to advise the NAMRAD Principals and the TTCP national authorities on the full breadth of issues arising from the potential use of modern simulation technology throughout the equipment life-cycle. It is widely recognized that such technologies have the potential to revolutionize the overall product introduction process. Experience in civil aerospace suggest that the biggest potential impact comes from radical reductions in development times and costs, with additional benefits in terms of procurement flexibility at 'right first time systems'. There are, however, a number of broader technical issues which have to be addressed before SBA can be successfully integrated with and interfaced to existing processes within the defence environment of the TTCP nations. These include, but are not confined to:*

- *the use of simulation at different parts of the life-cycle, e.g. concept formulation, requirements elicitation, design, test & evaluation, and during operations and maintenance;*
- *the management of information relating to the product definition, including the inputs and outputs from simulation activities and the necessary review processes*
- *the role for a standard underlying systems engineering life-cycle, such as ISO 15288;*
- *links to analysis and trade off studies;*
- *the role of simulation in whole life cost reduction;*
- *linkage to operational systems, e.g. to manage repair and maintenance and to support progressive update;*
- *the handling of COTS items within the Modeling environment;*
- *model V&V, especially in a contractual environment;*
- *interactions between customer and contractor-owned models, and associated technical issues, e.g. maintaining confidentiality and security;;*
- *simulation and reference models to support systems of systems.*

The AG tabled its final report at the July 1999 annual meeting of the JSA. The report is available to TTCP members through national channels. The report summarizes national SBA activities, the proposed system engineering framework in which SBA would reside, the characteristics of the SBA information management environment, and the challenges in forming effective teams of subject-matter experts in order to effectively resolve system

challenges during the system life cycle. The AG has recommended that a new JSA Technical Panel for SBA be formed to include the following Focus Areas:

- *increasing awareness of SBA benefits;*
- *participating in production of SBA architectures;*
- *facilitating practical experiments with SBA concepts; and*
- *facilitating improvements in SBA methods and tools.*

At its 1999 annual meeting, the JSA agreed to form the new JSA-TP-4 on System Engineering for Defence Modernization. The TP is mandated to address system engineering technologies and practices to improve defence management processes, including Simulation Based Acquisition. The latter issue is pursued further at JSA-ML-9903.

***Issue Ref No**: JSA-ML-9702 (Issue Closed)*

***Issue**: Wide-Area Surveillance/Recognized Picture for Coalition Operations*

***Date Entered**: June 1997*

***Champion**: JSA-AG-6 Wide Area Surveillance/Recognized Picture (CA Chair)*

***Status**: Issue Closed. JSA-AG-6 was formed in June 1997 to develop recommendations. Its final report was reviewed by JSA at its July 1999 annual meeting. The strategy to implement the AG recommendations was addressed by JSA, C3I and SEN in Sep-Oct 1999. The TTCP Exec Chairs agreed at the 2000 Exec Chairs Workshop that C3I Group would lead a pan-TTCP activity to progress the AG recommendations.*

***Context**: JSA-AG-6 was tasked to study and comment on the architecture and components required for a theater-level surveillance system aimed at the production of a Coalition Recognized Picture (CRP) among coalition forces across a spectrum of conflict scenarios, specifically identifying how national strategic and tactical (surveillance) assets could contribute to the common picture. Issues of technological compatibility and information flow for tactical and strategic operations among coalition partners were to be addressed.*

As defined by the AG, the Coalition Recognized Picture (CRP) is the common picture necessary to support coalition operations: it provides shared situation awareness over the area of interest assigned to the coalition force commander. The CRP represents an architecture to collect, fuse and correlate information to form, share and maintain the situation awareness picture for unified action. Because it depends on the scenario and on the levels of command, it is a tailored image of the battlespace, based on information identical to all levels.

Wide area surveillance (WAS) is the systematic observation of the area of interest to provide the input necessary to build the CRP: it is therefore surveillance for a purpose. Compared to the CRP, the structure for WAS is more fuzzy because surveillance systems and collection assets tend to be stove-piped, especially in coalition operations where each member of the coalition is expected to contribute surveillance resources.

The AG tabled its final report at the July 1999 JSA annual meeting. The report is available to TTCP members via national channels.

The final report contains 18 issue papers that discuss in some detail the key technical challenges that need to be addressed. These are summarized in the following table.

The final recommendations of the AG regarding follow-on TTCP activities were as follows:

- *create or task a technical panel to act as the integrator of all issues relating to the CRP;*

- *research the application of network-centric concepts and capabilities for the creation of a CRP;*
- *research the development of information management technologies specific to the generation of the CRP.*
- *conduct research into the development of an architecture planning and analysis tool set for use by commanders and planners; and*
- *conduct experiments that test the coalition's ability to create the CRP.*

As a next step in advancing the AG recommendations, the Exec Chairs of JSA, C3I and SEN Groups, with the US Deputy, will meet with AG-6 representatives in Sep-Oct 1999 to discuss the appropriate structure and sharing of effort among the Groups.

Category	***Issue***
Collection	*C1 - Coalition wide area surveillance collection management*
	C2 - Coalition essential elements of information (EEIs)
	C3 - Standardized or compatible precision location information systems (blue forces)
Information Processing	*P1 - Automatic correlation, association, fusion and accountability*
	P2 - Data set visualization
	P3 - Node loading (saturation and internal transformation)
	P4/D1 - Potential value of "network centric" solutions for CRP dissemination requirements
	P5 - Data and information sharing
	P6 - Processing shared data
Dissemination	*D1/P4 - Potential value of "network centric" solutions for CRP dissemination requirements*
	D2 - Interoperability with legacy systems and "low tech" partners
	D3 - Automated dissemination and management processes
	D4 - Compatible automated multi-level security and information assurance capabilities
System of systems enablers	*E1 - National and coalition architecture products*
	E2 - Information architecture planning, analysis and management tools
	E3 - WAS / CRP taxonomy
	E4 - Requirements analysis
	E5 - Performance measurement

***Issue Ref No**: JSA-ML-9703 (Issue Closed)*

***Issue**: Planning/Analysis for Coalition Operations*

***Date Entered**: June 1997*

***Champion**: JSA-TP-3 Joint Concepts and Analysis (UK Chair)*

***Status**: JSA-TP-3 was requested in June 1998 to consider cooperative development of the appropriate OA tools to improve decision-making in coalition capability planning. strategies for realizing these tools were discussed during a workshop held in conjunction with the TP-3 May 2000 annual meeting. Future work in the area has been integrated into the TP-3 program of work.*

***Context**: The effective planning and execution of coalition operations across the spectrum of conflict will be dependent on the ability of the coalition partners to plan for, then exploit, the individual capabilities of the participants. For example, effective Command and Control of the coalition force will be directly influenced by the level of interoperability available among the operational-, system- and technical architectures of the individual participants. Further, the assignment and successful execution of specific missions by the coalition partners will depend on the operational, equipment and technological capabilities each partner is able to bring to theatre, the ability to optimally plan the operation and then configure the force by taking these individual capabilities into account.*

Currently, there are activities underway at various levels of maturity and resourcing within the OA communities of the TTCP nations to develop tools and methodologies that will improve the quality of planning for coalition operations in the above environment. There is clearly benefit to be derived from sharing information and/or jointly collaborating in these developments.

The approach adopted to address the issue was to conduct a workshop to explore the problem of capability planning for coalition operations as part of the May 2000 TP-3 Annual Meeting. This workshop was strongly supported with a range of background papers from Australia, the meeting host nation, and explored thoroughly through syndicate sessions represented by all nations and service representation from Australia. The outcomes led to plans to incorporate the problem domain in the TP-3 program of work.

***Issue Ref No**: JSA-ML-9704 (Issue Closed)*

***Issue**: Vulnerability of Information Operations across Joint/Combined Operations*

***Date Entered**: June 1997*

***Champion**: CA National Representative*

***Status**: Issue closed. To be subsumed by the TTCP Information Warfare way ahead to be discussed at NAMRAD 98.*

***Context**: The combat capability referred to as "information operations" - to suitably protect own-force information and related processes, or to disrupt the enemy's information and processes - is viewed to be critical to success on the modern battlefield. The armed forces of the TTCP nations are either planning for or introducing the digitization attributes necessary to enable information superiority. As complex a task that digitization is proving to be, the task is even more complex when considering operations involving multiple services and/or allied nations. In the case of joint or common operations, it is essential that sufficient levels of interoperability exist among the command and control information systems of the partners for effective C2 to be executed. However, in the search for interoperability, it may be that vulnerabilities to attack of the joint/common C2 information systems are inadvertently introduced. Therefore, it is critical that these vulnerabilities be identified, eliminated and/or managed through appropriate technological and/or procedural means.*

TTCP has assessed how best to address collaboration in the area of Information Warfare. A pan-TTCP Workshop on Information Warfare lead by the C3I Group, held in the US on 8-10 July 1998, considered how best to proceed with TTCP collaboration in this area. Recommendations were presented at NAMRAD'98 and a way ahead accepted.

This issue will be addressed in the future as part of the broader TTCP IW initiative.